PowerChain Management solutions

12–60 kW

EATON

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High-density computing environments demand more power

Today, the management of a data center or network operations center places you under the intense pressure to reduce costs while dealing with inescapable operational realities:

Expanding power demands. The blade servers that are satisfying business demands can also raise the demands for power consumption in the same footprint. Rack power requirements that were once at 60 watts per U may now have to be delivered at levels up to 600 watts per U with redundant power supplies.

Increasing power costs. Utility rates have a common recurrence, they always go up. Energy costs are emerging as the second highest operating cost (behind labor) in 70% of data centers worldwide. (Gartner, 2009). To this point, many organizations are researching and developing plans to implement efficient and affordable power solutions in their facilities.

Excessive heat. Blade servers generate a lot of heat that translates into high demand for additional energy. A fully loaded rack of blade servers can use close to 30 kW of power. This equals over 100,000 BTU/hr in heat generation that requires cooling–wasted heat, which is not utilized in any way. Since cooling adds huge costs to data center operations, IT organizations are forced to increase their power efficiency to counteract the inefficient heat and cooling problems.

If you manage, engineer, or plan the present and future of a data center or network operations center, you are already aware of these critical issues and their impact on operations. Your challenge is to make decisions that provide efficient power protection and distribution for growing loads, while managing the heat. Eaton is ready to help you with these challenges.

Introducing the BladeUPS uninterruptible power system

Designed specifically for high-density computing environments, the Eaton® BladeUPS® delivers 12 kW of efficient, reliable power in only 6U of standard rack space, including batteries. Expand capacity by combining 12 kW modules in a building block fashion to deliver 60 kW of redundant backup power from a single rack enclosure. This powerful configuration delivers higher power density than competitive, modular solutions, while dissipating only one-third of the heat.

The standard internal batteries provide needed ride-through power until an auxiliary power source takes over or systems are gracefully shut down. Extend runtime up to 34 minutes at full load (or 76 minutes at half load) with extended battery modules (EBMs).

Power protection for:

- Blade servers
- Small, medium and large data centers
- Network closets
- PBX and VoIP equipment
- Networking applications: IPTV, security
- Storage devices: RAID, SAN
- Database clusters

Eaton BladeUPS—12 kW

Features

- Protects mission-critical applications with innovative backup power technology designed specifically for high-density computing environments
- Supports the constant moves, adds and changes of today's dynamic data centers with a modular, scalable, and flexible backup power architecture
- Conserves valuable rack space with 12 kW of power in only 6U of rack height, including batteries
- Accommodates growth by enabling building-block upgrades from 12 kW to 60 kW in a single rack enclosure
- Reduces energy costs and cooling needs through best-in-class efficiency performance
- Delivers highest levels of reliability at the rack with patented Powerware® Hot Sync® paralleling technology and intelligent bypass design, field proven in thousands of large data centers globally
- Simplifies installation and service with true plug-and-power connections and hot-swappable batteries and electronics modules
- Increases battery life through ABM® technology, resulting in more uptime and fewer battery replacements

BladeUPS in a rack (60 kW, N+1 redundant)

EATON TAA COMPLIANT

The Eaton BladeUPS is made in the U.S.A and is TAA Compliant.

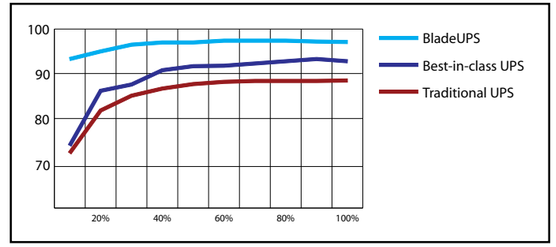
Reduce energy costs with high efficiency

As utility rates continue to climb, energy efficiency becomes a sticking point with data center managers.

The BladeUPS delivers an outstanding, industry-leading 98 percent efficiency in normal operation. Even at <50% load, where efficiency is typically much lower, this UPS performs more efficiently than competitors' modular products at full load.

In addition to dramatic cost savings, high system efficiency extends battery runtimes and produces cooler operating conditions within the UPS, extending the life of components and increasing overall reliability and performance.

Even small increases in efficiency can quickly translate into thousands of dollars. The example below compares annual and five-year energy costs for the BladeUPS and a competitor's solution. It's easy to see that the BladeUPS pays for itself through energy and cooling savings alone.



Even at very small loads, where you would expect efficiency to be lower, the BladeUPS is still more efficient than other UPS products at full load.

Example

	BladeUPS	Traditional UPS
UPS efficiency rating	>98%	91.5%
Rack power consumption	60 kW	60 kW
Cost per kWh	$0.10	$0.10
Cost to operate per hour	$6.18	$6.56
Monthly power savings	$273 saved each month with the BladeUPS	
Heat dissipation (BTUs per hour)	6,300	19,000
*Monthly cooling savings	$246 saved each month with the BladeUPS	
Annual savings with the BladeUPS	$6,238 saved each year	
Five-year savings with the BladeUPS	$31,190 saved in five years	

** Cooling savings based on industry calculation of cooling costs per kW of power costs.*

Reduce cooling costs with lower heat dissipation

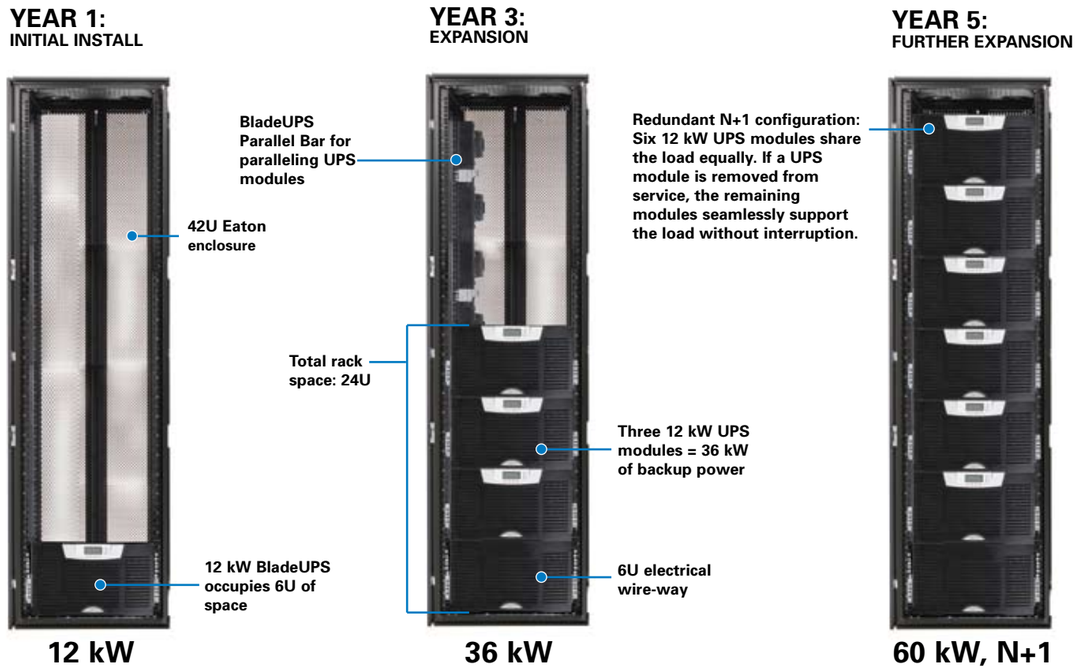
The high-efficiency BladeUPS reduces the power requirements for the data center. In the example shown, the BladeUPS reduces energy costs by an average of $273 per month. In addition, the high efficiency of a BladeUPS reduces overall air conditioning needs by more than one third; multiply that with a reduction in cooling costs by one-third and utility bills are further decreased by an additional $246 per month. The savings compound with the data center size and the number of UPS products. The low heat dissipation means this UPS can be located close to equipment racks without a concern for creating hot spots in the data center.

The BladeUPS remains cool even in a data center full of servers.

Meet current and changing requirements with modular architecture

The building block of the BladeUPS system is a 6U rackmount module that provides 12 kW of backup power protection. The system expands easily to provide maximum results. As your data center grows, the system's modularity plays a key role in optimizing your capital planning and deployment. Using the patented and field-proven Powerware Hot Sync paralleling technology, up to six BladeUPS modules can be paralleled for extra capacity or redundancy, providing 60 kW of redundant backup power protection in one 19-inch rack.

Patented load-sharing control intelligently distributes the workload among modules without requiring direct synchronization links among them. Any module can provide backup support for any other, with no interruption or downtime. For instance, in a redundant system you could perform full maintenance on any module without any interruption of conditioned power to the protected IT equipment.


YEAR 1:
INITIAL INSTALL
YEAR 3:
EXPANSION
YEAR 5:
FURTHER EXPANSION
BladeUPS Parallel Bar for paralleling UPS modules
42U Eaton enclosure
Total rack space: 24U
12 kW BladeUPS occupies 6U of space
Redundant N+1 configuration: Six 12 kW UPS modules share the load equally. If a UPS module is removed from service, the remaining modules seamlessly support the load without interruption.
Three 12 kW UPS modules = 36 kW of backup power
6U electrical wire-way
12 kW
36 kW
60 kW, N+1

The BladeUPS is designed to be extraordinarily flexible—configured as a single module or multi-module system (up to six modules) in a standard 19-inch rack enclosure. The modular design enables you to deploy just the right amount of backup protection at the right price for your current needs and expand later whenever needed.

Easy setup with simple parallel configuration changes

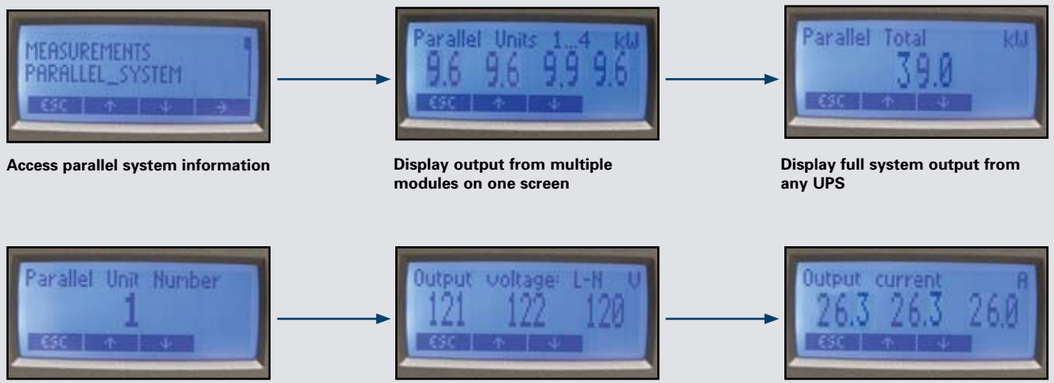
The BladeUPS is easy to install, configure, and deploy—and easy to expand later, without help from Eaton. To link multiple BladeUPS modules into a parallel configuration, all you need is a BladeUPS Parallel Bar—a simple kit installed in the bottom of the rack and on the back rail. IT personnel can then simply plug additional modules into the parallel bus bar. The system is intelligent, so it automatically detects paralleled modules and fully configures itself for parallel operations.

Adding modules is a simple plug-and-power procedure for IT personnel with safety-approved connectors.

Administrators can monitor and manage the BladeUPS using the unit's LCD panel or remote monitoring software. The UPS provides data for the entire multi-module system, as well as the individual module. In addition, a module working in a parallel configuration can be separated at any time and re-deployed as a standalone module to meet a data center's changing requirements.

The BladeUPS Parallel Bar easily connects up to six modules in parallel.

The brightly backlit 2.6" LCD shows parameters of the system or a module.



Access parallel system information

Display output from multiple modules on one screen

Display full system output from any UPS

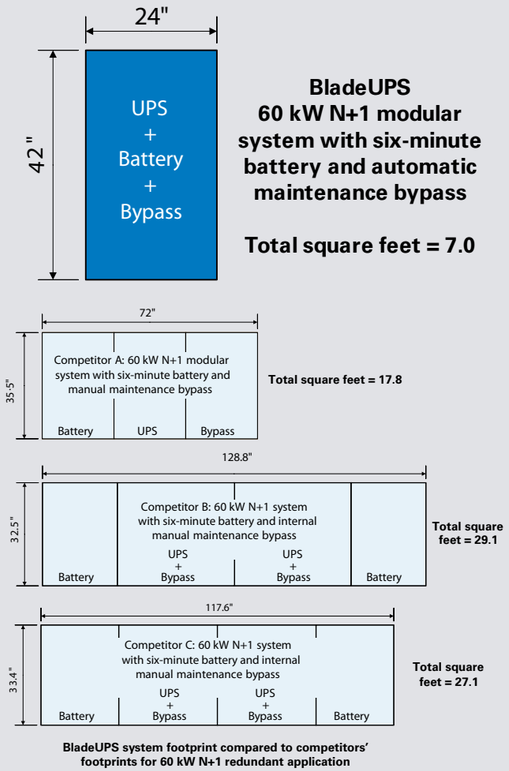
Review any UPS from any display

Display individual module output voltage

Display individual module output current

Save space with high power density UPS

The BladeUPS offers the smallest footprint of any UPS in its class, as well as double the power density of any other UPS on the market. This compact design leaves more space for IT equipment in the rack and data center.



BladeUPS system footprint compared to competitors' footprints for 60 kW N+1 redundant application

Expedite deployment with flexible installation options

The BladeUPS can be deployed in a variety of system architectures to support the specific requirements of your computer room or data center, and to support the desired level of redundancy (Tier I through Tier IV, as defined by the Uptime Institute).

Centralized power protection for small computer rooms. Start with one 12 kW module and expand to 60 kW with N+1 redundancy in single 19-inch rack enclosure.

Zone power protection for mid-sized computer rooms. Deploy 60 kW (N+1) in a 19-inch rack to protect a row of IT equipment racks.

Distributed power protection. Distribute 12 kW modules to protect one to three racks—thereby achieving zero footprint power protection.

Hybrid power protection. Stronger redundancy of power protection for equipment racks containing critical IT equipment.

- For dual-corded loads with one source on a central UPS and the other on utility power, you can back up selected loads with a local BladeUPS, deployed in a distributed or zone fashion.
- For dual- or single-corded loads on a central UPS, you can back up selected loads with a local BladeUPS (distributed or zone) in series with the central UPS. This configuration provides maximum reliability close to critical loads, with minimal heat dissipation and maximum efficiency.

With the flexibility to deploy and re-deploy a BladeUPS either in single or parallel systems—data center managers can tailor power protection to adapt to changing needs, often without the need for an electrician or service technician.

Eaton also offers an assortment of plug-and-play power distribution accessories with various input and output connections to distribute power from the BladeUPS to rack power strips or directly to high-power servers. You can choose from distribution designs with or without monitoring capability, for redundant or non-redundant applications spanning from 0U to full rack height.

System architecture with the BladeUPS

Centralized power protection

Centralized power protection—dual power feeds

Zone power protection

Distributed power protection

Hybrid power protection

Central large UPS

Rack enclosure with blade servers

BladeUPS

Count on reliable system performance and uptime

Recognizing the mission-critical nature of data center operations, the BladeUPS has been designed for premium reliability and continuous operation. The rackmount BladeUPS incorporates leading technologies that Eaton developed for its largest UPSs, such as:

Robust paralleling. With Eaton's patented Powerware Hot Sync technology, UPS modules work in peer-to-peer fashion when configured in a parallel system. Most other paralleling systems on the market use a single central main controller with a backup controller. If the main controller fails, the system must recognize this and transfer control to the backup control, or the entire system fails. With Eaton's patented approach, each UPS module operates independently, yet is completely synchronized with the others. There is no change in control, therefore no single point of failure.

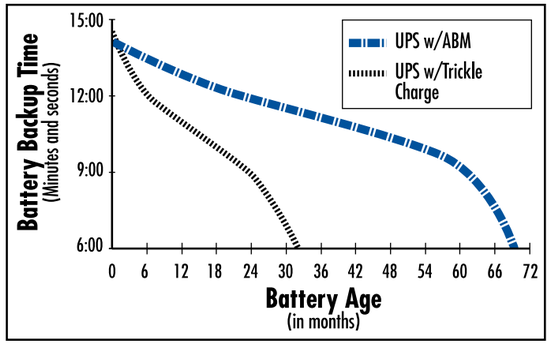
Intelligent maintenance bypass switch. The internal switch inside the UPS chassis automatically activates bypass mode whenever a power module is removed. This feature ensures that power to protected loads is not accidentally interrupted by human error. (If the UPS is in a parallel environment with N+1 redundancy, removing an electronics module only causes that particular UPS module to go offline while the protected equipment is supported by other modules in the configuration).

Static bypass switch. All BladeUPS modules have their own static switch for normal operations and for internal bypass in case of a high overload condition, output load fault or internal failure.

Hot-swappable electronics and battery modules. Replacing batteries or electronics modules can be done in minutes without interrupting power to IT equipment. This hot-swap capability helps reduce mean time to repair (MTTR) and dramatically improves the availability of the protected IT equipment.

Eaton's advanced battery management technique. ABM technology significantly extends battery service life with a unique three-stage charging technique. The UPS automatically tests battery health and provides advance notification when preventive maintenance is needed, allowing ample time to hot-swap batteries without ever having to shut down connected equipment.

IT staff can easily replace battery modules.



Eaton's ABM technology significantly increases battery service life.

Flexibly distribute power to racks

With Eaton's rack power module (RPM)

Partner the BladeUPS with an RPM to create a highly flexible, adaptable power delivery architecture at the rack level. The RPM delivers up to 36 kW of power in an organized manner to loads of various voltages, power cords and layouts.

The 3U RPM can be deployed in the same rack with the UPS and IT equipment; there's no need for a dedicated infrastructure rack. The resulting architecture has fewer cables to manage, fewer distribution points to monitor and greater flexibility for IT personnel to make changes without an electrician.

Consider a Tier II data center with 42 racks at 5 kW per rack: the BladeUPS with RPM can meet power requirements with half the number of racks, 60 percent less rack space, 45 percent less cabling and 41 percent less square footage than other vendors' power distribution products that require dedicated racks. These advantages make the BladeUPS with RPM ideal for distributed protection in small to mid-sized data centers, or to add zone protection in large data centers that have centralized UPSs.

Eaton RPM

Simplify UPS installation and maintenance

The BladeUPS is easy to install, configure and deploy. All BladeUPS modules (UPS and battery) come with rackmount kits for easy installation in standard equipment racks. In-house IT staff can install and service this UPS themselves. Adding parallel units for future expansion is a simple, plug-and-play procedure.

The BladeUPS battery trays are user-replaceable so that one person, working alone, can replace the battery without disrupting data center operations or power to protected equipment.

Most IT teams are confident managing the BladeUPS without outside help because of its simplicity. However, Eaton is ready to provide support with its world-class service organization of 300 customer service technicians in North America and 1,200 internationally. These factory-certified and trained service technicians deliver 7x24 support including on-site corrective and preventive maintenance, battery solutions, service training, integration services and spare parts.

The BladeUPS is also compatible with Eaton's eNotify Remote Monitoring system, which features 7x24 real-time monitoring of 100+ UPS and battery alarms, with Eaton's staff of technical experts able to respond immediately and resolve many issues remotely. eNotify delivers monthly e-mail reports that detail UPS performance and alarm history.

Flexible runtime options

Each BladeUPS can be configured with its own external battery backup. The BladeUPS design eliminates this single point of failure. Competitive, modular systems use a centralized battery bank with a shared connection point that presents a potential single point of failure.

IT staff can easily install electronics modules.

BladeUPS extended battery module

BladeUPS Typical Battery Runtime Chart (in minutes)

Single Module		Internal Battery	+ 1 EBM	+ 2 EBMs	+ 3 EBMs	+ 4 EBMs
Load kW	Load %					
12	100%	4.7	9.5	17	27	34
11	92%	5.4	10.9	20	30	38
10	83%	6.2	13	22	33	42
9	75%	7.3	15	24	38	48
8	67%	8.7	18	28	43	55
7	58%	10.7	23	32	50	64
6	50%	13.6	27	42	60	76
5	42%	18.5	33	51	73	94
4	33%	23	42	66	94	120
3	25%	30	56	89	128	165
2	17%	44	85	137	199	258

BladeUPS Typical Battery Runtime Chart (Parallel UPS, in minutes)

Number of UPS Models	Total Load kW	Internal Battery	+1 EBM per UPS		+2 EBMs per UPS		+3 EBMs per UPS		+4 EBMs per UPS		Configuration	Load %	kW per UPS Modules
			Min	EBMs	Min	EBMs	Min	EBMs	Min	EBMs			
6	60	6.2	13	6	22	12	33	18	42	24	N+1	83%	10
5	48	6.7	13	5	23	10	35	15	44	20	N+1	80%	9.6
4	36	7.3	15	4	24	8	38	12	48	16	N+1	75%	9
3	24	8.7	18	3	28	6	43	9	55	12	N+1	67%	8
2	12	14	27	2	42	4	60	6	76	8	N+1	50%	6

Monitor the power infrastructure from anywhere

You can monitor the BladeUPS over your LAN or the Internet to stay informed of conditions in the power protection infrastructure.

With Intelligent Power® Manager supervisory software, you get a global view across the network from any PC with an Internet browser. Exceptionally versatile, the software is compatible with power devices supporting a network interface, including other manufacturers' UPSs, environmental sensors, ePDUs, shutdown applications and more.

In the event of an extended power outage, Eaton's free NetWatch software works in conjunction with the ConnectUPS X-Slot® Web/SNMP card to allow you to gracefully and sequentially shut down connected devices, including virtual machines. NetWatch is compatible with ESXi and vSphere from VMware.

Cisco Compatible

Eaton NetWatch Client 5.0 has tested compatible with Cisco Unified Communications Manager 4.3

Using Power Xpert® software, you can also monitor the status of multiple UPSs and ancillary devices to accurately diagnose past events and predict future conditions.

FORESEER® software analyzes thousands of data points to proactively manage key equipment throughout an enterprise-wide infrastructure. This system interfaces with an extensive collection of devices from most major manufacturers of power and environmental equipment, as well as subsystems for fire detection and suppression, security, fuel handling and building controls.

Software and connectivity options provide a unified window into the state of IT and facilities systems. With this level of visibility, you can transform the power system into a powerful strategic asset.

Gain a new level of confidence

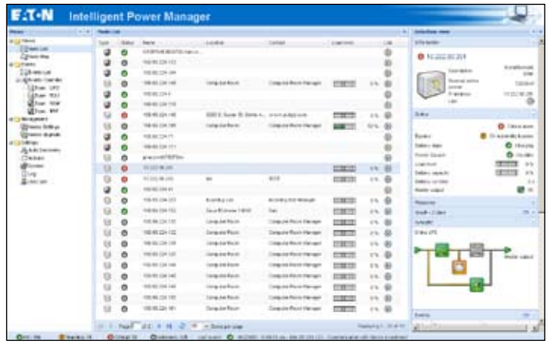
The innovative BladeUPS delivers reliable, energy-efficient backup power protection for your organization's critical IT systems today as well as the flexibility to support your changing needs tomorrow.

Eaton offers a full line of technology solutions designed to address the power crunch in IT infrastructures. In fact, Eaton offers solutions for the entire power system, from the point where utility power enters your facility all the way to the individual server. Eaton's solutions for the computer room include:

- Rackmount and freestanding power protection systems deliver computer-grade power with battery backup throughout a data center
- Versatile power distribution products and cable management accessories make it easy to deliver power exactly where needed, even as data centers adapt and evolve
- Attractive and functional enclosures and structured wiring closets turn any location into a virtual, secure data center

Learn more about complete, integrated solutions for protecting and organizing your IT equipment.

1.800.356.5794
www.eaton.com/bladeups



Intelligent Power Manager supervisory software is included at no charge (up to 10 nodes) with the BladeUPS.

Power Xpert software was designed to seamlessly handle Eaton's communicating equipment in a graphical manner without additional serial interfaces, protocols or customization.

A configurable user interface displays critical data center information with FORESEER software.

Technical specifications[1]

General characteristics	
Power rating	12 kW per UPS module
Efficiency	Up to 98%
Heat dissipation	371W/1266 BTU/hr at 100% rated load
Cooling	Fan cooled, temperature microprocessor monitored; front air entry, rear exhaust
Audible noise, normal operation	<60 dBA at 1 meter
Altitude before derating	1000 meters (3300 ft ASL)
Input characteristics	
Input voltage	208 Vac and 400 Vac models
Voltage range	208V model: 180 to 265 Vac 400V model: 311 to 519 Vac
Frequency range	50 or 60 Hz, ±5 Hz
Input current distortion	<5% with IT loads (PFC power supplies)
Input power factor	>0.99 with IT loads (PFC power supplies)
Inrush current	Load dependent
Input requirements	Three-phase, four-wire + ground
Bypass source	Same as input (single feed)
Generator compatibility	Fast sync slew rate for generator synchronization

Output characteristics	
Rated output voltage	208V model: 180 to 225 Vac, Ph to Ph 400V model: 180 to 240 Vac, Ph to N
Output configuration	Three-phase, four-wire + ground
Output frequency (nominal)	50 or 60 Hz auto-detection on startup
Frequency regulation	0.1 Hz free running
Load power factor range	Lagging: 0.7 Leading: 0.9
Total output voltage distortion	<3% with IT loads (PFC power supplies) <5% non-linear or non-PFC power supplies

Battery characteristics	
Battery type	VRLA - AGM
Battery runtime (internal)	13 minutes at 50% load 4.8 minutes at 100% load
Battery string voltage	240 Vdc
Battery test	Automatic battery test standard (remote scheduling capable); manual battery test from front display
Battery recharge profile	ABM three-stage charging technology
Battery cut-off voltage	Variable from 1.67 VPC at <5 min runtime to 1.75 VPC at >90 min runtime
Battery low condition	Announced with alarm
Extended battery capability	Yes, add up to four additional 3U battery enclosures (~34 min at 100% load, >1 hour at 50% load)

Physical characteristics	
Dimensions H x W x D, in (mm)	UPS: 10.3 (6U) x 17.4 x 26.0 (267 x 442 x 660) EBM: 5.2 (3U) x 17.2 x 26 132 x 437 x 660)

Note:
Total chassis weight without batteries or electronics: 100 lb (46 kg)
Total chassis weight with batteries or electronics: 307 lb (140 kg)

Total UPS weight without batteries	135 lb (61 kg)
Total UPS weight with batteries	307 lb (140 kg)
EBM weight	170 lb (77 kg)

Communications and user interface	
Software compatibility	UPS ships with Software Suite CD containing Intelligent Power Manager supervisory software and NetWatch protection software
X-Slot Bays	Two available for the cards listed below
Optional X-Slot communication cards	**Application:** **PowerXpert Gateway Series 2000 card** **Web/SNMP:** Connect UPS card **Modbus RTU:** Modbus card **Modbus TCP/IP:** PowerXpert Gateway Series 2000 card **IBM eServer™ (i5™, iSeries™, or AS/400®):** Relay interface card **N/O, N/C (dry contacts):** Industrial relay card **Parallel:** Powerware Hot Sync CAN Bridge card
Control panel LCD	Two lines by 20 characters Four menu-driven interface buttons Four status-at-a-glance LEDs
Multi-language	English standard; 20 languages available
Configuration changes	User capable, firmware auto configures
Dry contact inputs	Two, user-configurable
Dry contact outputs	One, user-configurable

Service	
Installation	User capable, located in the IT racks
Preventive maintenance	User capable, optional factory service available
Corrective maintenance	User capable, optional factory service available
Serviceability features	Hot-swappable batteries Hot-swappable electronics module Automated internal maintenance bypass Auto-configure firmware Flash firmware upgradeable

Certifications	
Safety	208V model: UL1778, cUL 400V model: CE
EMI	208V model: FCC Part 15 Class A 400V model: EN 62040-2 Class A
Surge protection	ANSI C62.41, Cat B-3
Hazardous materials (RoHS)	EU Directive 2002/95/EC Category 3 (4 of 5)

Warranty	
Standard	18 months from date of shipment
Warranty repair	Factory depot repair or replace

Service Support Agreements[2]	
Depot	PowerTrust Express
On-site 5x8	PowerTrust Value
On-site 7x24	PowerTrust eight-, six- or two-hour response

Options and accessories

Detachable input cord
Detachable input/output cord assembly
Detachable paralleling cord assembly
EBMs
3U output sub-distribution module
0U to 3U rack power strips
60 kW BladeUPS Parallel Bar, Top Entry, Bottom Entry & 4-high versions
Four-post rail kit
Environmental Monitoring Probe (EMP) for temperature and humidity monitoring
X-Slot communication cards (see Communications and user interface section)
3U Maintenance Bypass Module
External Battery Interconnect for use with 400V models

1. Due to continuing product improvement programs, specifications are subject to change without notice.
2. eNotify Remote Monitoring and 7x24 technical support included.

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Denmark: 45.3686.7910
Finland: 358.94.52.661
France: 33.1.6012.7400
Germany: 49.0.7841.604.0
Italy: 39.02.66.04.05.40
Norway: 47.23.03.65.50
Portugal: 55.11.3616.8500
Sweden: 46.8.598.940.00
United Kingdom: 44.1753.608.700

ASIA PACIFIC
Australia: 61.2.9693.9366
New Zealand: 64.0.3.343.3314
China: 86.21.6361.5599
HK/Korea/Taiwan: 852.2745.6682
India: 91.11.4223.2300
Singapore/SEA: 65.6825.1668

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